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NAVAL WAR COLLEGE  
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"Clearing the Vital Choke Points in the Sea Lines of  
Communication--Its not just a Navy problem and solution"

by

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A paper submitted to the Faculty of the Naval War College in  
partial satisfaction of the requirement of the Department of  
Operations

The contents of this paper reflect my own views and are not  
necessarily endorsed by the Naval War College or the Department  
of the Navy.

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<p>This paper is primarily a thought process. Many scholarly works and group efforts have pointed clearly to the abysmal condition of the United States Naval Mine Countermeasures (MCM) both in capability and size. The problems which the U S Navy has in this capability stem from two reasons: first, an historic lack of effort in funding a robust MCM capability, and second, there are limitations in the laws of physics which make detection of mines a difficult process.</p> <p>The purpose of this paper is not to "split the arrow" which has already landed in the center of the Navy's MCM forces, but to stimulate the reader to not view MCM as the "Navy" problem. There are no quick solutions to the problems. However, the operational commander who reviews the entire process of mine warfare and its countermeasures has a better chance of employing and assisting a Naval force in dealing with this threat.</p> <p>There are two purposes to this paper-first is to show that MCM operations are not just minesweeping/minelighting; second is to suggest that Army, Air Force, and Marine forces may be very useful in keeping the vital choke points in the Sea Lines of Communication (SLOC) open against Naval mines.</p>			
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## PREFACE

This paper is primarily a thought process. Many scholarly works and group efforts have pointed clearly to the abysmal condition of the United States Naval Mine Countermeasures (MCM) both in capability and size. The problems which the U S Navy has in this capability stem from two reasons: first, an historic lack of effort in funding a robust MCM capability, and second, there are limitations in the laws of physics which make detection of mines a difficult process.

The purpose of this paper is not to "split the arrow" which has already landed in the center of the Navy's MCM forces, but to stimulate the reader to not view MCM as the "Navy" problem. There are no quick solutions to the problems. However, the operational commander who reviews the entire process of mine warfare(what country/organization has acquired what mine all the way through to how an adversary might re-seed a minefield) and its countermeasures has a better chance of employing and assisting a Naval force in dealing with this threat.

There are two purposes to this paper-first is to show that MCM operations are not just minesweeping/minehunting(with subsequent neutralisation); second is to suggest that Army, Air Force, and Marine forces may be very useful in keeping the vital choke points in the Sea Lines of Communication(SLOC) open against Naval mines.

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## I. INTRODUCTION

Today's operational commander must be prepared to use joint forces in solving the problem of opening a strait or canal which has been closed by the enemy through the use of sea mines.

Mining of the sea is a cheap effective, easily deployed threat<sup>1</sup> which is difficult to counter using even the best technology in the world.

Mines can serve to defensively protect a vital capability by denying the enemy unlimited access/control of strategic waters. Likewise, mines can be used in an enemy's own waters to prevent the enemy use of his own ports and Sea Lines of Communication. Mines may serve political purpose (as in a demonstration) or they may be an integral element of warfighting regardless of the purpose, these highly destructive devices are most effective when used in points which choke the Sea Lines of communication (SLOC) in an effort to restrict/stop the flow of traffic.

Under the worst of circumstances a motor vessel damaged and aground blocking a waterway could render a choke point useless as its hulk blocks passage and companion mines restrict/inhibit salvage efforts. At the lower end of the spectrum the psychological effects on mariners created by the presence of mines and subsequent economic impact might be enough to significantly drive up the price of oil or strategic minerals to levels having a detrimental impact on world markets.

To the commander who is in a hurry to move troops supplies and equipment through a choke point enroute or within his Area of Responsibility (AOR), failure to move his war machine through a strait or canal could ultimately result in battlefield failure.

Today's operational commander is faced with the potential situation of having to wait for a less than robust Naval MCM force to arrive to clear the SLOC of mines as his operational situation in theater deteriorates while he waits. He is further faced with the situation of having to clear a strait or choke point of mines using other than naval forces until MCM forces do arrive.

Depending on the situation, once his MCM forces do arrive, the commander will most likely find that he may require a combination of non naval forces to support/conduct the Naval commander's effort. MCM forces must be protected, shore threats which could jeopardize the MCM efforts must be eliminated, and intelligence about the threat must be gathered. While eventually Naval forces by themselves can make mine clearance/avoidance happen organically, the goal is to get the choke point open as quickly as possible.

This paper uses two extreme examples of choke points which could be mined; the Straits of Hormuz, and the Panama Canal. The Straits of Hormuz case is to illustrate the considerations for the operational commander in dealing with a mined vital choke point which has been mined by a belligerent nation (Iran) which possesses a modest sophistication in mine warfare, and has the

military resolve and limited capability to actively oppose efforts to neutralize a minefield in the Straits. The Panama Canal case is chosen as a contrast to show the considerations the commander and his forces will have in dealing with a guerilla or terrorist type of mining threat where the host nation is not belligerent, and active opposition to MCM is not present.

Ninety five percent of all supplies and equipment moved to the Persian Gulf before and during Desert Storm passed through the Straits of Hormuz.<sup>2</sup> What if Saddam Hussein had wanted to invade Saudi Arabia and very early in his plans had mined the Straits of Hormuz? What would "Schwarzkopfs' nightmare"<sup>3</sup> have looked like then?

## II. Statement of the Problem

Of the hundreds of Straits and canals world wide there are several which are of vital interest to the United States and its allies. Among these are the Panama Canal, Suez Canal, the Gulf of Suez, the Red Sea and its approaches, the Straits of Gibraltar, the Straits of Hormuz, and the Straits of Korea<sup>4</sup>.

Should these choke points be mined (using anything from a low tech "dumb" mine to a highly sophisticated state of the art mine) movement of military forces and commerce could be stopped or significantly delayed<sup>5</sup>. United States naval Mine Countermeasures (MCM) forces are limited in size, slow in transit, and are not generally forward deployed (there is 1 MCM-1 class ship deployed in the Arabian Gulf). The operational commander is faced with serious problems (especially during a crisis where movement of forces to a region within a time limit is crucial to the resolution of the crisis) of how to safely get his ships, equipment and supplies through in the quickest amount of time. Given that MCM assets have not deployed or will not arrive for several days what can be done? Are there any actions which forces available can commence immediately? Even after the MCM forces arrive are there actions which non naval forces can be taking to speed up the mine clearance effort.

There are no quick, and easy solutions to the problem of neutralizing a minefield in a maritime choke point. Countermeasures to the mine threat technologically lag the threat and are restricted to the laws of physics. There are no new



"minebusters" in development or production , and the solutions to counter the evolving mine threat once discovered(if discovered) will take a long time to reach a fleet capability.

Mines are affordable by the third world, they do not need to be technologically complex to be effective, and there are countries willing to sell their mines to anyone who produces the currency to buy them. Some third world countries such as Iran, Iraq, Libya and the former Yugoslavia have an indigenous mine production capability<sup>6</sup>.

Once obtained, mines are deployable from craft as small as a 20 foot Boston Whaler or a Cessna aircraft all the way up through some of the largest ships and aircraft in the world<sup>7</sup>. In the case of drifting mines, in the right currents, they can be deployed from land.

The only thing the operational commander can do is to analyze the problem of sea mines, and use every asset available to counter this threat. He cannot sit back and wait for the MCM forces to show up, and then let the U S Navy worry about "its" mine problem.

### III. The Threat

In general mines are designed to damage ships in two ways. One way is through direct contact resulting in a breach of the ships hull. Damage is intended to be so great that the flooding created by the hole cannot be stopped. The other way is through a synergistic effect of a concussion wave travelling through the water along the ships hull coupled with a destructive gas bubble. This expanding gas bubble displaces the water around the hull of the ship and then allows the ship to "fall back" into the hole created by the gas bubble and suffer structural damage (a good detonation will break the ship's keel).

The most common methodology of describing mines breaks them into three separate categories--moored, bottom, and drifting<sup>8</sup>.

#### THE MOORED MINE

Moored mines are most the most common mine available on the world markets. Simply defined, a moored mine is a naturally or semi-buoyant mine which is tethered to an anchor on the ocean floor. When it is used as a contact mine, it is the least complex of all mines and the easiest to produce. Moored contact mines are the type which damaged the SS Bridgeton, the USS Samuel B Roberts, and the USS Tripoli. Moored mines can also be used in deep water with sophisticated detonation devices so that in water depths that might be too deep for the use of a bottom mine, the same destructive effects (concussion wave with a gas bubble) can be obtained.

The moored mine may be detonated in numerous ways such as by contact, by remote activation (tilt rod), or by combination magnetic and/or acoustic influences.

The moored mine is most generally the least difficult (least difficult does not mean or imply easy) of all the mines to detect, because it is not buried in the ocean floor, and in the case of the least sophisticated mines it is big, bulky, and somewhat easier to sight visually and with a sonar. Moored mines are also less difficult to neutralize, because they can be mechanically cut from their tethers, and neutralized on the surface (some of the more sophisticated mines may be rigged to detonate if their tethers are cut)<sup>9</sup>.

#### THE BOTTOM MINE

Bottom mines besides being the most deadly of mines (if properly employed in the right water depth) are the most difficult of all the mines to neutralize. The biggest reason that these mines are difficult to neutralize is because they are hard to detect. Since these mines lay on the bottom of the ocean they have a tendency to become buried in mud and silt. Burial doesn't have a negative impact on the mines magnetic sensors, and it does not diminish the explosive force of the mine. To further exacerbate the difficulty of detecting these mines, the ocean floor is cluttered with numerous drums, cars, containers, barrels, etc. which may look like a mine. Detecting bottom mines is a time consuming and tedious business.

The bottom mine is restricted in its use by water depth. If the water is too shallow, a good destructive gas bubble will not form, and the synergistic effect of hull concussion and a destructive gas bubble will not occur. If placed in water too deep, neither a strong concussion wave or gas bubble will occur.

#### THE DRIFTING MINE

A drifting mine is one which is not tethered or moored on the sea bed<sup>10</sup>. Naturally or semi buoyant, this mine is designed to drift with the current. Indiscriminant in its choice of shipping, this mine is poor to use when attempting to target a particular type of ship. Excellent terrorist type weapon to use for psychological impact on mariners. This mine is used to give the mariner the feeling that he can never be safe. Generally drifting mines are not as large as a moored contact mine, or as sophisticated as a bottom mine. Occasionally, because of bad weather or age, moored mines can break free from their tethers, and become drifting mines.

These three generic types of mine are readily available on the world wide market<sup>11</sup>. Known exporters of these types of mines include, but are not limited to : Italy, Russia, North Korea, Yugoslavia, and China. It is also a fair assumption to believe that for the right price, and for the right cause, Iran, Iraq, and Libya could and would export their own less sophisticated mines to other third world countries.

Iraq at the start of Desert Storm was indigenously producing three of its own mines which were believed to be patterned after the Italian Manta mine, and the former Soviet Union mine designs<sup>12</sup>.

#### IV. MCM FORCES

Current plans for the United States Navy are to build an MCM force consisting of:<sup>13</sup>

- 14 Avenger (MCM-1) class mine countermeasures ships
- 12 Osprey (MHC-51) class coastal minehunter ships
- 2 Squadrons of MH-53E mine countermeasures helicopters
- 1 MCM command ship (converted LPH-11 Uss Inchon)

From this force, as required, the navy could deploy an MCM group consisting of :<sup>14</sup>

- 1 MCM command /support ship
- 4-6 MCM-1 class ships
- 1 Squadron of MH-53E
- 4 detachments of Explosive Ordnance Deposal (EOD) teams

This group will not normally deploy with a given battlegroup. Deployment of these forces is slow and primarily limited by the speed of the MCM ships (about 10 knots-whereas a battlegroup transits at about 16 knots. If the distance required to transit is excessive, (such as the transit from the United States to the Straits of Hormuz), the MCM ships might have to be heavy lifted aboard a commercial carrier, and transported to the theater. These ships do not transit any faster than the ships would (10-12 knots), however, they would allow for the ships to arrive in theater requiring minimal maintenance. For operation Desert Shield/Desert Storm four mine countermeasures ships (3 MSO and 1 MCM) were Heavy lifted to the Persian Gulf aboard Super Servant III. It took nearly 50 days from the date of onload in

Norfolk Va. to the date of offload in the Arabian Gulf in the coastal waters of Bahrain.

The MCM group as planned, does provide a more efficient organization in MCM operations once on scene. The drawback to the concept is still that when the commander needs these assets he may not have them until well past when they were most urgently needed.

## V. THE COMMANDER'S ISSUES

Commander's issues are unfortunately hypothetical and rhetorical questions which in peacetime have no certain answers. Nonetheless, if a theater commander or a unified commander is going to adequately deal with this threat, he must be aware of the issues long before the first mine is detonated in a vital choke point.

### 1). One mine is a minefield

One mine detonated in a choke point indicates that an entire minefield has been laid. The size is unknown, the types of mines used has not been determined, and who laid the mine is quite probably uncertain as well. Yet the commander must consider that the choke point is mined even if the only mine laid was the one detonated. Until the size, type, mixture, and density of a minefield can be determined, the minefield must be considered lethal to any ship passing through the choke point. The commander must also consider, that the enemy who laid the mine was smart, and laid the most lethal minefield possible with the resources he had available.

A random detonation could mean that a ship meeting the magnetic/acoustic characteristics of the detonator activated it, or an improperly set detonator activated on the wrong type of ship, or the mine was set to detonate on any ship, or many ships met the influence characteristics of the mine, and after enough



activations, the mine detonated. But, whatever the actual case is, unless the commander and his forces have actual physical proof of the threat or high confidence intelligence, he must assume that the entire choke point is lethal!

In this same regard, since it is only prudent to assume (until certain otherwise) that the minefield is lethal, countermeasures efforts can be hampered by a minefield laid down without logical process or doctrine. A minefield laid haphazardly, randomly, by untrained personnel can sometimes present a bigger problem initially, because no logical assumptions can be applied to what was used, and where it was laid down.

## 2). Expediency versus risk

Does the need for supply/resupply outweigh the potential loss of ships. Is it more important to loose a ship or ships to a minefield as long as 80 percent of the resupply effort gets through immediately? At what percentage of confidence of clearance of the choke point can the commander decide that the risk versus need is worth taking? In some cases waiting an extra day can only gain another 1 or 2 percent in confidence that an area is cleared, or that a route through the field is safe. These questions will have no answers from an armchair in peacetime. The commander however, will need to decide what risks he wants his Naval forces to take at the time dependent on his

threats/state of forces and how badly he needs to bolster, or resupply his forces.

### 3). Countering the Countermeasures

Once assets to conduct mine countermeasures are on scene, will the enemy attempt to deny the US/Allied forces the ability to conduct countermeasures operations? In the hypothetical situation of a belligerent nation such as Iran mining the Straits of Hormuz, the commander must realize that efforts to conduct mine countermeasures will be opposed. This opposition could come from Land Based aircraft, terrorist type speedboats, fast patrol craft, or land battery of guns and cruise missiles.

Can the Naval commander effectively conduct mine countermeasures while concurrently protecting his Carrier Battle Group (CVBG), the MCM platforms, and his high value units (logistics ships, Amphibious operations ships, heavy lift)? If the naval assets are within range of land based aircraft this could prove to be a difficult job. Should in theater assets be assigned missions to attrite the enemy land based air prior to the arrival of the countermeasures forces? How high a priority within the theater should this matter be given?

### 4). Re seeding the minefield

Given that a choke point minefield can be cleared, neutralized, or the individual mines avoided, the enemy cannot be allowed to re-seed the minefield. Will the Naval commander

possess the ability to prevent re-seeding? Can guerilla, or unconventional warfare personnel take advantage of weather, darkness and currents to covertly re-seed the fields? Will naval forces alone possess the ability to effectively shut down port activity, and restrict air traffic over the choke point. Even though the minefield was initially laid with one type of mine, an enemy could certainly confuse shipping by re seeding with a different type of mine (possibly even a drifting mine laid from shore under the cover of darkness).

#### 5). Bottom line Issues

The operational commander cannot afford to stand by and wait while his vital lines of supply/resupply are interrupted by sea mines. Conduct of mine countermeasures operations must be planned out long before the first mine is detonated. A commitment of all types of forces based on capabilities and not service doctrines may very well be required.

The tactical problem of sea mines with its strategic implications, will require operational action.

## **VI. OPERATIONAL ACTIONS FOR A TACTICAL PROBLEM**

Until now this paper has discussed a threat, a military problem, and related issues which are tactically oriented. This has been done to lay the groundwork for the actions that an operational or theater commander can take to achieve the military conditions he needs. The operational commander is not "out of the picture" in naval MCM. He has need to get his ships and logistics through the choke points, and he may also have assets which can help speed up and support the naval mine countermeasures process.

In providing potential actions for the commander when this threat is encountered, the Straits of Hormuz, and the Panama Canal will be considered for the reasons stated in the introduction.

### **1). Do not allow the minefield to be laid**

**"There is a premium on comprehensive intelligence and offensive Mine Countermeasures-the most effective of which is to prevent mines from going into the water in the first place...."**  
ADM Frank B. Kelso III<sup>15</sup>

Unquestionably the very first consideration for the operational commander is how to prevent mining of a choke point in the first place.

There are three distinct actions which could prevent a country or organization from laying sea mines

#### **a). prevent the enemy from acquiring/building mines**

While this action is listed in the discussion, steps to prevent a nation from acquiring sea mines or from building them

are not considered realistic. Attempts militarily to prevent acquisition would have to be clearly defined in national policy and subsequent strategy. There are too many nations with mine capability, and several of them are willing to export their mines with no conscience attached to any nation which can pay for them. Furthermore, once purchased, there are far too many means to ship them into a country undetected. Sales and movement of sea mines into a potential hot spot of regional violence can however provide a possible intelligence tipper on a nation's intentions.

b). Destroy the stockpiles in the country

Once an enemy has acquired sea mines, a staging/storage area will need to be established in the country (and most likely with access to a port) in order to control the stock/stockpile. These areas, if located and a reasonable belief that the weapons would be used in an evolving crisis were established, could be destroyed by any number of means. The theater commander could do so using air forces on interdiction strikes, or special operations forces might be capable of doing the destruction.

This action is more likely than preventing a belligerent from obtaining the weapon in the first place, but still a very risky, and unlikely course of action. First, in order to take this action the commander would have to have strong intelligence which could indicate intent to use the weapons, and also to determine where the weapons are. Even if the intelligence were good, this would require a National Command Authority (NCA)

decision. If approved to conduct a sort of pre-emptive strike, war could ensue.

Using the case of Iran and the Straits of Hormuz, this could be a sound strategic and operational choice, since Iran does possess the ability to adequately mine the Straits, and freedom of navigation through the Straits would be center to US/Allied military plans in the region.

On the lower end of the spectrum with the case of the Panama Canal this is could be a viable alternative, even though it would require heavily on having an effective intelligence network in place.

For either situation this form of action would require NCA approval, and clearly would have strategic consequences.

c). Deny the enemy the opportunity to lay the mines

Destroy the enemy ability to lay the mines. Make denial of enemy minelaying a high enough priority before hostilities occur to allow heavy surveillance (space systems, land based/sea based air, special operations, national assets) of the choke point and the ports in close proximity.

Either destroy the minelayers (sea or air) in the act, or destroy the minelayers as they leave their bases/ports/airfields. Inherent in this course of action is the difficulty of determining what a "minelaying platform" is, since almost anything that flies or floats could be a minelayer.

During Operation Desert Shield, COMUSNAVCENT determined that Iraq was laying sea mines in the waters off Kuwait. He subsequently requested authority to sink the Iraqi minelayers in the act and was denied permission to do so.<sup>16</sup> This decision was predicated by political/diplomatic negotiations, a desire to not start the war too soon, and interpretation of international law.

Had COMUSNAVCENT received permission to attack, Iraqi efforts to mine the waters would have been severely hampered, and coalition forces would have spent a lot less time minehunting and minesweeping.

Using the case of the Panama Canal, the minelaying platforms would be much harder to identify (fishing boat or minelayer?) and most likely would be done covertly. Here the commander might consider using Special operations forces to interdict the minelaying process. All weather/nighttime capabilities could be especially helpful in detecting small boats conducting minelaying under the cover of darkness. Special Operations helicopters could be utilized in much the same fashion as they were with the Navy during operation Earnest Will in 1987. Airborne platforms with radars could vector the helicopters (MH/AH-6) to targets for ID/destruction.

In 1987 the Iran Ajar was caught in the act of minelaying at night time by US Army helicopters. The ship was not only stopped from minelaying and subsequently sunk, but it was also an intelligence windfall because of documents on minelaying intentions, and mines which were captured.<sup>17</sup>

**2). Neutralizing the minefield that has been laid**

Once the minefield has become "fait accompli" the situation is primarily a navy tactical one, however the operational commander cannot simply turn his back because now the Navy has it. The Naval component commander may have several weak areas where he will require actions from the operational commander.

**a). until the MCM forces arrive**

As previously indicated once a minefield is detected, there may be a long wait for the MCM forces to arrive if they are not close to the area. During this wait for the MCM forces the Naval commander will be doing all possible to determine as much about the minefield as possible. His primary concerns will be focussed on gathering intelligence on the weapons in the minefield, and on denying the enemy the ability to continue to mine or re-seed the field.

Overhead sensors can be used to track shipping in the area (obtain historical tracks)<sup>18</sup>. If patterns can be established the dimensions of the minefield might become clearer. National assets for imagery might be diverted from routine missions to help gather data on port activity, storage areas, suspected minelayers, etc.

In the case of guerilla activity along the shores of a canal or its approaches to the Panama Canal, special operations teams may still be required to operate to deny further mining of the canal.



b). Once the MCM Operations have begun

Execution of MCM operations is the most demanding step of a Naval Commanders efforts to clear a choke point. This step is also the one where the Naval commander's forces will be most taxed. For it is at this point that the Naval commander must protect his MCM force completely, so that his individual commanding officers may focus their efforts on safely working in the minefields. Ships and helicopters will be restricted in maneuverability; the ability to evade shore battery/fire will not exist.

At this same time as previously mentioned, the Naval commander must prevent re-seeding, protect his high value units, and get the choke point cleared, (or find a safe path through which to navigate). He may require Land based air support for interdiction of enemy targets ashore, to suppress shore artillery, or strike storage sites. Against a determined enemy with a military capability the Naval air forces may be fully extended.

## VI. CONCLUSIONS

While the Navy is faced with the problem of developing technology and forces to deal with the sea mine, a mined choke point critical to theater of operation is an operational commanders dilemma. Given that sea mines are cheap, accessible, and historically have been highly effective against shipping, United States naval forces and unified commanders can expect to deal with this problem in the future.

Mine Countermeasures in a choke point are tactical in execution, but they have to be understood and supported by the operational commander; he can help influence the outcome through the use of all forces over which he has control. The application of Special Operations forces, Army, Air Force, and Space assets, may "fly in the face of individual service doctrine", but as long as there is a deficiency in sea mine countermeasures the operational commander must consider using these forces contrary to doctrine. The extent to which the forces will be used will depend on the urgency to open up the choke point, and what capabilities the commander is being denied.

Use of non-naval forces to conduct sea mine countermeasures, is not a solution to an old problem it is simply a means to help deal with a very stubborn threat. Until the Navy can develop (if even technologically feasible) and field a panacea of a solution to the mine threat the operational commander will be forced to plan on committing non-naval forces to the solution.

As the situation stands today, both the Navy and the operational commanders must do a great deal of planning to deal with this threat long before the first sea mine is laid.

## **VII. RECOMMENDATIONS**

1. The United States Navy not lose momentum on "shoring up" the inadequacies the fleet possesses with respect to MCM
2. That operational commanders with vital maritime choke points/canals in their AOR need to review the effect of mining on choke points in their respective AOR.

Consideration must be made from the intellectual starting point that Naval MCM forces may not be immediately available, and once available, may not be in sufficient quantity to render a quick resolution to the problem.

An intelligence assessment should be made to help identify what type of mine threat might be used in the operational commander's given area. Most likely method of laying the mines should be considered, and by whom could a serious minelaying effort be undertaken. Determine if a sufficient intelligence network exists to be of any use with the intent being to "tip off" intentions of saboteurs. Examine the possibility of denying an opponent the ability to place mines in the choke point.

3. Approach the sea mine problem using all services and departments available. If we are truly a joint force, then plan to solve the problem using joint forces.

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